Parking Pricing and Curbside Management in New York City

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ABSTRACT

Parking pricing is often seen as a promising way to better manage parking demand and reduce traffic congestion. New York City implemented pricing strategies for commercial loading in the dense Manhattan business district in the early 2000s, and for on-street metered parking along retail and commercial corridors in residential neighborhoods through a series of pilots beginning in 2008. This paper discusses the role of these parking strategies in the context of the varied demands on curb space in different areas of New York City, and then focuses on the peak-rate parking pilots. These pilots are among the first of recent parking pricing initiatives in major U.S. cities to show documented results. Experience from these pilots demonstrates that on-street parking pricing can be effective in achieving goals of increased turnover and availability of spaces, although in different ways depending on neighborhood conditions such as existing levels of parking demand and availability of off-street parking. The pilots show the importance of community outreach and engagement in the planning, implementation and evaluation of pricing strategies. Finally, surveys of drivers conducted as part of the pilots suggests that the widely used parking occupancy goal of 85% needs to be further evaluated.

INTRODUCTION

There is growing interest in major cities across the United States in opportunities to use market-rate parking pricing to better manage demand for on-street parking and reduce traffic congestion. Parking pricing can encourage motorists to shift to transit, biking and walking and thus reduce demand on street space from single-occupant vehicles. Parking pricing can also increase the availability of parking spaces, reducing mileage spent searching for a space for while also increasing motorist convenience. Based on local conditions and goals, parking pricing can be tailored in many different ways – geographically, by time of day, and for different classes of vehicles (e.g., passenger cars versus commercial vehicles or trucks). Furthermore, parking can be priced differentially for on-street and off-street spaces to encourage turnover of on-street spaces and to encourage all-day parkers to use off-street spaces.

Some of the best-known experience with parking pricing is from relatively small cities such as Redwood City, Calif. and Pasadena, Calif. *(1)* Interest in these concepts extends to major U.S. cities, however. Chicago, San Francisco, Los Angeles and Washington DC, as well as New York City, have undertaken major parking pricing initiatives in the last several years. The objectives and scale of city programs has varied considerably. Chicago entered into a citywide concession agreement for the management of all 36,000 of the city's on-street and 880 of its off-street parking spaces in a deal that netted the City of Chicago an up-front payment of $1.2 billion. *(2)* San Francisco and Los Angeles have embarked on a federally funded set of parking initiatives that include market-rate pricing of on-street and off-street spaces, pavement sensors that will yield real-time information on parking space availability, and parking guidance systems for motorists. *(3,4)* Washington DC has planned and in one neighborhood implemented escalating on-street parking rates to encourage turnover and manage high-demand ballpark events. *(5)* New York City has implemented peak-rate pricing pilots in three neighborhoods, focusing on neighborhood retail and commercial areas.

Most of these parking initiatives are in the planning or early implementation phases. While there is much to learn from these phases, only limited results are available on post-implementation experience. New York City's initial peak-rate parking pilots, by contrast, offer

documented experience on program impacts, looking across metrics that include parking turnover, availability and public acceptance.

This paper first discusses the role of parking pricing strategies in the context of the varied demands on curb space in different areas of New York City and then reviews the New York City Department of Transportation's (NYCDOT) approach and experience to date from PARK Smart peak-rate parking program in two neighborhoods where the pilots have been completed. This experience can provide valuable insights for further planning and implementation of parking pricing in dense urban environments.

PARKING IN THE CONTEXT OF DEMANDS FOR CURB SPACE

In highly active and congested urban street systems, space is measured and accounted for foot-by-foot, and hour-by-hour. The need for parking must be balanced with other local access needs – for commercial deliveries, bus stops, taxi stands, curb cuts, etc. – as well as for mobility needs (e.g., general traffic flow, pedestrian space, and bus and bike lanes). Since the amount of curb space is generally fixed, the often oversubscribed needs for curb space must be reconciled. These decisions are made in the context of strong interest from local residents and businesses, and must take account of the implications for traffic and pedestrian safety, traffic flow, bus speeds and bus reliability, and bike network development.

In New York City, these decisions must be sensitive to the highly varied characteristics of business districts, commercial, industrial, retail and residential areas around the city. NYCDOT pilots new approaches to parking and curb management in limited areas, with relatively intense attention to planning, community outreach, data collection and evaluation. Through the piloting process, NYCDOT can assess results and further develop and refine program features. The piloting process also provides an opportunity for stakeholders to experience the actual effects of the policies, and provide feedback based on their observations and experience. Based on a series of implementations, NYCDOT can then deploy parking and curb management policies on a broad scale at appropriate locations throughout the city.

NYCDOT has developed a robust toolbox of such policies using this process that can address the varied curb needs of different neighborhoods. The curb management toolbox includes:

- **Paid Commercial Parking**. Paid commercial parking replaced un-priced commercial loading using an escalating price schedule. Results of a pilot in 2000 on heavily congested Midtown streets showed a reduction in average parking duration from 160 minutes to 45 minutes, with only about 25% of the vehicles parked for more than an hour. Since 2001, paid commercial parking has been expanded in stages and now covers most commercial parking spaces in Manhattan from 60th Street to 14th Street and in Chinatown and surrounding areas. This program represented NYCDOT's first implementation of parking pricing strategies to improve curb access and reduce congestion. It has been supported by the delivery industry because of its effectiveness in improving curb access and reducing congestion, particularly on narrow crosstown streets where one double-parked truck can block through traffic. Current rates for trucks and commercial vehicles making deliveries are $2.50 for one hour, $5 for two hours and $9 for three hours of parking.

- **PARK Smart Peak-Rate Parking Pilots**. While paid commercial parking focuses on commercial loading zones in the Manhattan central business district, PARK Smart focuses on on-street metered parking along retail/commercial corridors in predominantly

residential neighborhoods. NYCDOT implemented the first three of six planned pilots starting in 2008. Under this program, the parking rate during peak demand times is increased, with the goal of increasing turnover, improving access to metered parking spaces and reducing the time and mileage associated with searching for a metered parking space. This program is discussed in more detail later in the paper.

- **Bus Rapid Transit**. Select Bus Service (SBS) is New York City's initial implementation of bus rapid transit. First introduced in 2008, SBS routes currently operate on Fordham Road and Pelham Parkway in the Bronx and on First and Second Avenues in Manhattan. Three additional routes are undergoing planning and outreach.

- **Delivery Windows.** NYCDOT works with neighborhood merchants in retail corridors to identify opportunities to designate delivery windows, which provide curb space for commercial deliveries at specified times and places along the retail corridor. The goal is to improve the overall efficiency of curbside deliveries and reduce congestion and double parking. To date, delivery windows have been applied as part of each SBS project and in several neighborhoods in Brooklyn.

- **Off-hour Deliveries**. Freight deliveries into Manhattan exceed 100,000 trips daily, with 80% made to wholesale, retail and food enterprises. Beginning in August 2009, NYCDOT, along with a consortium of research institutions lead by Rensselaer Polytechnic Institute partnered with eight delivery companies and 25 business locations on a pilot program to encourage businesses to accept off-hour shipments through financial incentives and strategies to make the process easier, such as allowing "unassisted deliveries". Under this pilot, travel speeds to the first stop improved by up to 75%, with a decrease in delivery time from 100 minutes to 30 minutes. *(6)* Based on the success of the pilot. DOT is looking to promote the program and identify future participants in the program.

- **Pedestrian and bike safety improvements (daylighting, traffic calming, bike lanes).** Among NYCDOT's safety improvements, the agency has constructed sidewalk extensions into the curb lane to accommodate extremely heavy pedestrian flows, and "daylighted" intersections to give drivers a better view of crossing pedestrians. NYCDOT has also installed several hundred miles of bike lanes throughout the city, in some cases utilizing the curb lane, to create a safe and convenient bike network.

These initiatives are often implemented in various combinations. For example, Select Bus Service in the Bronx and Manhattan includes midday delivery windows to accommodate commercial loading needs. Paid commercial parking in the Theater District is converted to paid parking for the general public after 6 p.m. Curb regulations can be adjusted by location and time of day to balance competing needs over the course of the day and week.

PARKING PRICING OPPORTUNITIES IN THE CONTEXT OF LAND USE AND USES OF CURB SPACE

The opportunity to use parking pricing is greater in some areas of the city than others, depending on land use and primary uses of curb space. Table 1 and Figure 1 provide an overview of current conditions and neighborhood practices. As will be seen, pricing already plays a major role for both commercial loading and off-street parking in the Midtown and Downtown business districts. Neither of these CBDs have significant amounts of on-street

Table 1. Curb management in New York: Current conditions and management practices

Area	Current "curb ecology" (supply, demand, and management)	Unique issues (travel behavior, infrastructure, land use)	Effective tools
Midtown Manhattan	Commercial loading Bus loading and movement	Large proportion of VMT is fleets in motion (taxis and trucks) and through traffic, limiting the effectiveness of curb pricing to address congestion. Most goods loading takes place at curb (no alleys and few loading docks). Low private auto mode share.	Commercial Paid Parking Bus lanes/Bus rapid transit
Lower Manhattan	Commercial loading Agency parking Bus loading and movement	Most loading at curb. Low private auto mode share. Concentration of public agencies needing on-street parking.	Agency permit reduction Bus lanes
Outer-borough CBDs	Metered parking Commercial loading Agency parking Bus loading and layover	Large proportion of through traffic. Most loading at curb. Higher auto mode share and varying levels of rail access. Concentration of public agencies needing on-street parking.	Agency permit reduction Bus lanes/Bus rapid transit
Neighborhood retail corridors	Metered parking Bus stops Limited commercial loading	High meter compliance. Opportunities for shoppers to park on adjacent residential streets. Concern about competition among neighborhoods.	PARK Smart Delivery windows Bus lanes/Bus rapid transit
Residential streets	Un-priced private vehicle storage	Low household vehicle ownership, rich transit options in many neighborhoods.	
Industrial and institutional areas	Daytime loading zones	Most loading takes place at curb	Work directly with stakeholders to improve loading conditions

Figure 1. New York City's Central Business Districts and Neighborhood Retail Corridors
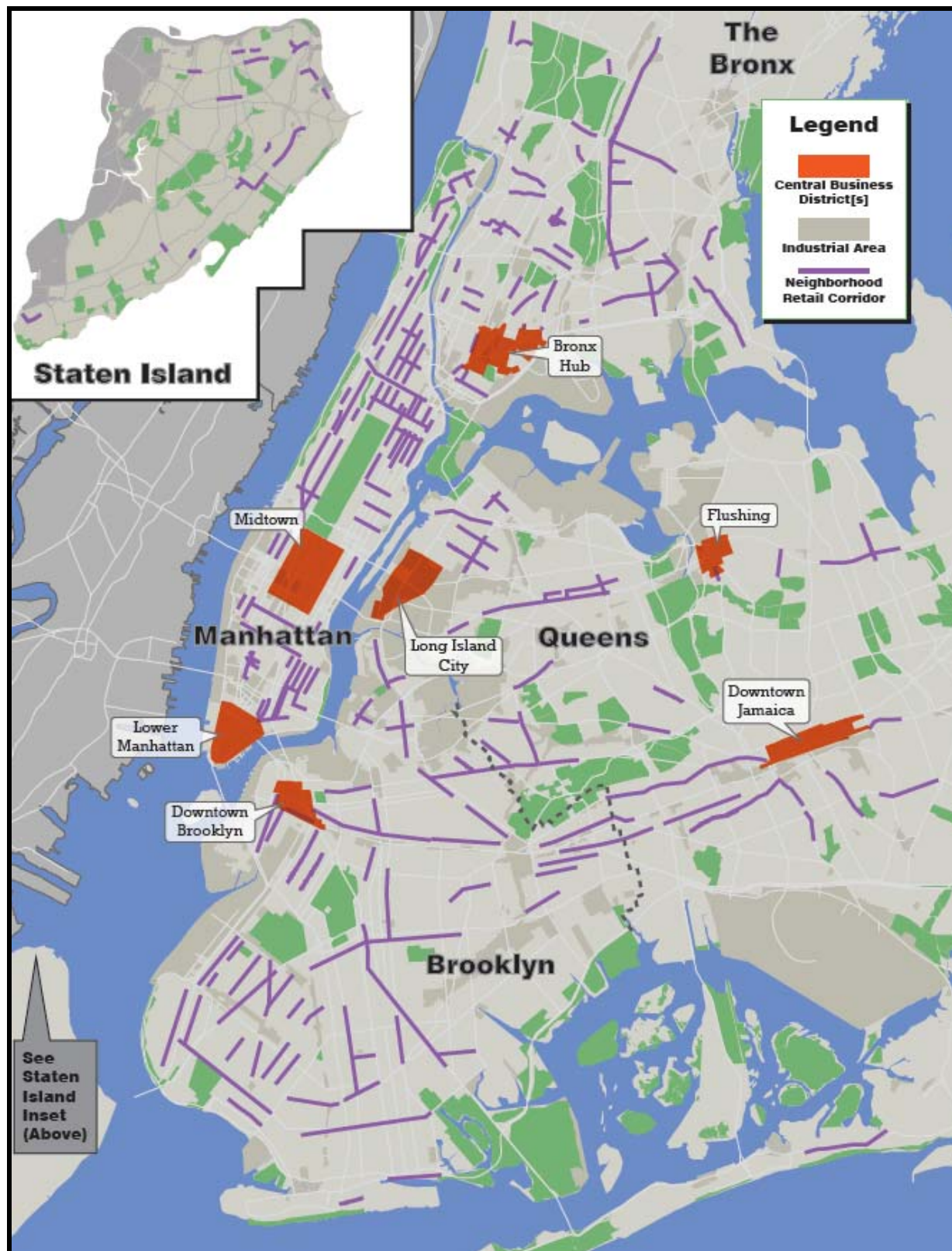
parking for the general public. The primary opportunity for the City to take additional steps with parking pricing thus occurs with on-street metered parking outside the Midtown and Downtown business districts.

Midtown Manhattan is the nation's largest CBD, with an extremely dense concentration of jobs, business activity and visitors. With about 75% of trips to, from and within Midtown taking place by transit and walking, *(7)* a large proportion of vehicular activity is comprised of taxis, trucks and other commercial vehicles. Most goods loading takes place at the curb, as there are no alleys and relatively few loading docks at office and commercial buildings.

To meet the needs of a dense business district, most curb space in Midtown is used for paid commercial loading, bus lanes, taxi stands and for general traffic flow during the morning and evening peaks. For commercial loading, NYCDOT's paid commercial parking program ensures efficient use of on-street these spaces.

For the general public, parking is almost exclusively off-street and is quite expensive. There are about 24,000 parking spaces in 155 off-street lots and garages in Midtown, all of them privately owned and operated. The cost of off-street parking varies considerably, from $8-15 for the first hour and $19-43 for all-day commuter parking. On average, commuters parking all-day (and generally using "early-bird" rates) pay about $24. *(8)* The high rate for one hour of parking strongly discourages motorists from using their cars for short trips within the Manhattan core. Relatively few cars are parked off-street for less than two hours. The high cost of parking all-day encourages use of transit for commuting and business purposes, and in part accounts for the low auto share for trips into the Manhattan core.

Except along the fringe of Midtown (e.g., east of Third Avenue and west of Eighth Avenues), there is no metered parking for the general public during daytime hours. (Paid commercial parking spaces the Theatre District are converted to general paid parking after 7 pm.) The price of the relatively few on-street metered parking spaces along the fringe of Midtown is $2.50 per hour, generally with a one-hour time limit.

Downtown Manhattan is the nation's third largest CBD, after Midtown and Chicago's Loop. Downtown is the nation's financial center, a major tourist destination and increasingly a residential area. Like Midtown, Downtown has a low private auto share and most commercial loading takes place at the curb. Parking pricing thus plays a similar role in Downtown Manhattan as in Midtown. Paid commercial parking provides an incentive for efficient use of curb space allocated for loading. Off-street parking rates similar to those in Midtown provide strong disincentive for private car use.

Perhaps the major difference with Midtown is that a substantial amount of curb space is allocated to government agencies since the area encompasses City Hall, headquarters of a number of city and state agencies, and the State and Federal court systems. "Placard" parking has been a significant concern of residents in the affected parts of Downtown Manhattan. Since 2008, the City has reduced the number of placards issued citywide by 53% *(9)*, and centralized the issuance of placards to and within the agencies to better control the number and use of parking permits.

New York is distinctive in having ***CBDs in the "outerboroughs"*** in addition to the Midtown and Downtown Manhattan CBDs. The largest of these are Downtown Brooklyn, Downtown Jamaica, Queens, and Long Island City, Queens. Flushing, Queens and the Hub in The Bronx, are somewhat smaller but share characteristics of the three larger outerborough CBDs as retail and commercial and to some extent office hubs. Traffic and pedestrian levels in

the outerborough CBDs are very intense and in some cases, comparable to those of Midtown Manhattan.

Outerborough CBDs have higher auto mode shares than in Manhattan. Several, most notably Downtown Brooklyn, also have a high level of through traffic. Nevertheless, most travel to and within these areas is by transit and walking.

Significant amounts of curb space are used for commercial loading, most of which takes place on-street, and for bus lanes. However, a significant amount of curb space is used for on-street parking for the general public as well as by City agencies and State and Federal courts.

On-street parking is generally priced at $0.75 per hour but somewhat higher in certain areas. Demand for these spaces is high, and drivers can have difficulty finding on-street parking. Double-parking and illegal parking at bus stops and fire hydrants are common occurrences. Even where off-street parking is available, drivers tend to search for lower-priced or free on-street spaces.

Neighborhood retail areas are located throughout the five boroughs of New York City, as shown in Figure 1. Some are comprised of a few blocks centered on subway stations, while others extend for a mile or more. Neighborhood retail streets are generally two to four lane streets, lined with ground-floor retail. Ground floor uses include retail stores of all types (e.g., grocery, pharmacies, clothing, books, general merchandise), restaurants, cafes, movie theaters, laundromats, banks, and professional offices serving to the general public (e.g., real estate brokers, doctors offices, lawyers). The surrounding land use is typically residential; parking along these streets is unpriced.

Local residents are nearly always the primary patrons of local establishments, and walking is the primary access mode. A significant number of people do come from further than walking distance, however, particularly for destinations such as favorite restaurants, specialty stores, doctors offices and movie theaters.

Most curb space along these corridors is allocated to metered parking. Parking is priced at $0.75 per hour in most of The Bronx, Brooklyn, Queens and Staten Island and up to $2.50 per hour in Manhattan, with one or two-hour time limits. Bus stops and (unpriced) commercial loading are the other major users of curb space along these corridors. Trucks and commercial vehicles use commercial loading zones where they exist but otherwise tend to double-park while making deliveries.

As in outerborough CBDs, demand for on-street parking is high in many neighborhood retail areas, particularly those with the most vibrant and dense concentrations of stores and restaurants. Curb occupancies at metered spaces often surpass 90% and exceed 100% at peak times, taking into account illegal parking in bus stops and at fire hydrants and double-parking. Most of these areas have little or no off-street parking available, and nearby residential streets also have few available spaces. As in outerborough CBDs, drivers can have difficulty finding on-street parking. Double-parking and illegal parking at bus stops and fire hydrants are thus common occurrences.

Residential streets are found throughout New York City. These streets are unpriced and only subject to street cleaning regulations that prohibit parking for several hours on one or two days a week. The adjacent land use varies from high-rise residential buildings to single-family homes with driveways. In areas without many driveways or off-street residential parking, on-street parking is an important source of parking for many car owners and is often in scarce supply.

Industrial and commercial areas are also found throughout New York City, as shown in Figure 1. As elsewhere, most commercial loading takes place from the curb in these areas. Curb space is thus allocated primarily to (unpaid) commercial loading.

There are, in sum, very significant differences in land use, transportation system characteristics and curb use in different parts of New York City. As a tool for demand management and reducing traffic congestion, parking pricing has most relevance in outerborough CBDs and neighborhood retail areas. Metered parking is a significant if not predominant use of curb space in these areas. By increasing turnover of parked vehicles, parking pricing has the potential to increase the availability of parking while reducing double-parking, illegal parking and vehicle miles traveled in the search for parking. NYCDOT's PARK Smart program has focused on these areas.

Pricing of on-street parking for the general public is of much less relevance in Midtown and Downtown Manhattan, where there is little if any on-street parking (metered or un-metered) for the general public. Commercial parking is already priced with escalating parking rates designed to encourage turnover and ensure availability of space at the curb.

PARK SMART PROGRAM

The overall goal of PARK Smart is to develop effective approaches to planning and implementing parking pricing in neighborhood shopping and commercial areas. The program focuses on areas of the city with high demand for on-street parking where pricing can be expected to improve space availability and traffic flow. Program design emphasizes community involvement and systematic program evaluation as essential to developing an effective program and gaining public support.

Data collection and evaluation is designed to document the effects of pricing on driver behavior, parking availability and traffic levels in New York City conditions. Data collection also includes opinion surveys of drivers, merchants and area residents to document public reaction to the program. Results informed decisions at the end of each pilot as to the future of peak rate pricing in each neighborhood. Results were also valuable in discussions with other communities that were considering a PARK Smart pilot.

Increasing parking rates is often controversial, and often seen by the public as simply a means of increasing revenue to the City. NYCDOT's community engagement was structured to help stakeholders understand program goals and the sometimes counterintuitive way that pricing can be effective in improving parking availability without driving away potential customers for local retailers. Community engagement was also structured to involve key neighborhood stakeholders in program planning, implementation and evaluation. This level of community involvement was instrumental in obtaining buy-in and in designing an effective program.

Initial outreach focused on identifying corridors that would benefit from PARK Smart and where stakeholders could be identified who were interested in working collaboratively with NYCDOT on a pilot program. NYCDOT staff presented the program to borough-wide boards composed of representatives of the city's 59 Community Boards (local advisory boards whose members are appointed by City Council members and Borough Presidents) and to business improvement districts which represent local property owners and merchants. Staff also consulted with the agency's borough commissioners who are intimately familiar with key neighborhood stakeholders. NYCDOT staff then reached out directly to potential supporters identified through these channels.

Work on three pilots and several potential future pilot areas grew out of these initial contacts. Through the course of developing, implementing and evaluating each pilot, NYCDOT met numerous times with representatives of residents, merchants, civic associations and Community Boards, held public forums to explain the program and answer questions, and presented program plans and results to these groups. To varying degrees, the pilots have been covered by neighborhood and citywide newspapers and television stations.

Due to the time-intensive nature of PARK Smart outreach and program evaluation activities, DOT structured the program as a series of six pilots to be implemented over three years. This approach allowed DOT staff to focus sequentially on each pilot area and to apply "lessons learned" from the initial pilots in developing subsequent pilots in other neighborhoods.

The initial PARK Smart pilots increased on-street parking rates at peak times, thus adapting the rate structure to time-of-day variations in demand. Based on initial studies, peak demand times were identified as early to mid-afternoon, and peak rates were established for the period from noon to 4 p.m.

Each pilot runs for approximately six months, followed by program evaluation and a decision as to whether to make the program permanent with or without further changes to the area covered, times that peak rates apply to, and other program features. The monitoring program includes data collection prior to implementation, one month after implementation, and six months after implementation. Data collection and evaluation for the pilots is funded through a $1.4 million Federal Highway Administration (FHWA) Value Pricing Pilot Program (VPPP) grant.

Program pilot areas

Pilot areas were selected based on parking conditions (e.g., high levels of demand for on-street parking, frequent double-parking, blocking of bus stops, etc.) and the presence of neighborhood stakeholders who were interested in working with DOT on program planning and implementation (see outreach section below). As of Fall 2010, three pilots were under way or completed, all in predominantly neighborhood retail corridors. The three neighborhoods are distinct in their neighborhood character, level of parking demand, off-street parking options and demographics.

Greenwich Village is a vibrant mixed-use and well-known Manhattan neighborhood, with many of New York City's most popular restaurants, bars and boutique stores. The neighborhood serves as a tourist and cultural destination, home to New York University and the New School, and retains a strong residential character. The PARK Smart pilot was undertaken in October 2008 with a peak rate of $2.00 per hour from noon to 4 p.m. and $1.00 off-peak. (To be consistent with citywide rate increases since the pilot, Greenwich Village rates have been increased to $3.75 per hour peak and $2.50 per hour off-peak.)

Park Slope is a primarily residential neighborhood in Brooklyn with neighborhood retail corridors on two north-south avenues (Fifth Avenue and Seventh Avenue) and two cross streets (Union Street and 9th Street). Park Slope also attracts visitors from surrounding neighborhoods in Brooklyn and a limited number of visitors (~5%) from outside of the borough. The pilot was undertaken in May 2009 with a peak rate of $1.50 per hour from noon to 4 p.m. and $0.75 per hour off-peak.

The *Upper East Side* is primarily a residential neighborhood in Upper Manhattan with very high residential density. The two corridors chosen for the PARK Smart pilot, East 86th Street and Madison Avenue have different kinds of retail. East 86th Street is mainly

characterized by "big box" retail chains, such as Barnes and Noble and Best Buy. Madison Avenue is characterized by high-end retail stores that sell designer clothing, accessories, antique furniture and jewelry. The pilot was undertaken in June 2010 with a peak rate of $3.75 per hour from noon to 4 p.m. and $2.50 per hour off-peak.

At the conclusion of the Greenwich Village pilot, NYCDOT made the pilot permanent and expanded the PARK Smart area, increasing the number of spaces affected from 270 to 390 spaces. Similarly, in Park Slope, NYCDOT made the pilot permanent and will expand the PARK Smart area from 262 to 542 spaces. In addition, the hours of peak rate pricing will be extended into the late afternoon and early evening, reflecting that high demand for parking occurs from noon to 7 p.m.

Key findings from PARK Smart pilots

Program evaluation and data collection cover the impact of each pilot on parking availability and turnover, traffic levels, and awareness and perceptions of drivers, area residents and merchants. Results showed improvements to parking conditions in Greenwich Village and Park Slope, although in different ways depending on local conditions. The pilots also showed quite different dynamics between parking rates and stakeholder reactions, as discussed below. (Note that results from the Upper East Side monitoring program are not available as of Fall 2010.)

Greenwich Village. In a neighborhood which has readily available off-street parking, pricing induced an improvement in space availability and greater turnover:

- Parking space availability improved, as occupancy dropped from 76% pre-implementation to 70% at the completion of the pilot during weekday peak periods.
- Turnover increased; the proportion of vehicles parked for less than one hour rose from 48% to 60%.
- 18% of drivers said the new rates affected how long they parked.

Awareness of the new parking rates was surprisingly low, and merchants showed little concern about the effect of the rate change on their businesses:

- 45% of drivers interviewed immediately after they had parked said they were aware of the new rates.
- 12% of passersby interviewed in the area said they were aware of the new rates. (Note that overwhelmingly, passersby came to the neighborhood by foot (46%), subway (38%) or bus (4%), while 9% came by car.)
- 34% of merchants said they were aware of the new rates.
- Only 10% of merchants felt that the new rates negatively affected their business; about the same percentage believed there was a positive effect and most saw no effect.

Overall, these results showed improved parking conditions as a result of the program. The high level of support for PARK Smart among organized community and merchant representatives in Greenwich Village showed that on-street parking pricing and availability are of relatively low salience in this highly transit and walking-oriented Manhattan neighborhood.

Park Slope. Although there were certain similarities between Greenwich Village and Park Slope in the impact of PARK Smart on turnover of parking spaces, the dynamics between pricing and parking demand and public acceptance was quite different due to the intensive

demand for on-street parking and merchants' much greater sensitivity to the importance of drivers to their businesses.

In Park Slope, the introduction of PARK Smart resulted in greater turnover and more drivers finding a metered space. However, saturation levels of demand and the lack of off-street parking options translated into continued high occupancy levels. Parking spaces that were "freed up" by the higher peak rate were quickly re-occupied by other drivers searching for a scarce on-street space.

- Occupancy rates for metered parking were very high prior to implementation of peak rates: 91% on Seventh Avenue and 82% on Fifth Avenue during the noon to 4 p.m. peak, with occupancies near 100% at many specific times.
- Occupancy rates measured six months and 12 months after implementation found essentially the same occupancy levels as pre-implementation.
- Turnover increased; the proportion of vehicles parking for less than one hour increased from 75% to 79%, accompanied by a 20% reduction in parking duration between April 2009 and April 2010.
- Consistent with the higher turnover, 18% more vehicles were able to find legal metered spaces in April 2010 as compared to the pre-implementation level a year earlier.
- 14% of drivers said the new rates affected how long they parked.

Despite a tripling of the price in the noon to 4 p.m. peak, many drivers and passersby were unaware of the new rates.

- 46% of drivers said they were aware of the new rates.
- 25% of passersby interviewed in the area said they were aware of the new rates. (Note that 15% of passersby had arrived by car, about one-half of whom parked at on-street meters, while 68% walked and 14% came by subway and/or bus.)

In contrast to Greenwich Village, merchants were generally aware of the rate change and a higher percentage (though still a minority) were concerned about the impact of higher rates on their customers and businesses:

- 76% of merchants said they were aware of the new rates.
- One-third expressed concern about the effect on their businesses, while most felt there was either a positive or neutral effect. Concerns included customers hurrying through the store, and customers asking merchants to make change for the meters (the survey was conducted prior to installation of Muni-meters, which accept credit and debit cards).

Traffic volume data collected in Park Slope showed that traffic volumes declined by 7% post-implementation compared with pre-implementation traffic levels. This decline may be at least partly due to drivers finding a parking space somewhat more quickly after vehicle turnover increased. (Traffic volumes in Greenwich Village, where there are heavy volumes of through trips, showed no significant change.)

Overall, the Park Slope pilot showed substantial progress toward program goals in the increased turnover at metered spaces, larger number of drivers able to find an available space and reduction in traffic volumes. At the same time, the pilot showed the difficulty of achieving measurable improvements in parking space availability in conditions of high demand for on-street parking combined with high sensitivity among key stakeholders with increased rates.

After extensive community engagement over the course of nearly two years, the pilot also showed that the establishment and expansion of peak rate pricing could gain strong community

support. In October 2010, the local Community Board unanimously voted in support of making PARK Smart permanent in the neighborhood and expanding the peak rate to the rest of the metered parking in the neighborhood, thus more than doubling the number of spaces in the program. The Community Board also supported expansion of the peak rate to include the late afternoon and early evening hours, which also show high levels of parking demand. The peak rates will thus apply from noon to 7 p.m. instead of noon to 4 p.m. as in the pilot. These changes will be implemented with the arrival of a new order of multi-space meters in Spring 2011.

Lessons learned

A number of lessons can be drawn from PARK Smart experience thus far. These lessons are highly valuable in developing effective uses of parking pricing in New York City and are likely to be interest to officials developing pricing programs in other major cities.

- **Parking pricing is effective in improving parking conditions, but the impacts differ depending on neighborhood characteristics**, most notably existing levels of parking demand, the proportion of local shoppers driving to the area and the availability of off-street parking. A doubling of the parking rate increased turnover and parking availability in Greenwich Village. In Park Slope, a tripling of the peak rate increased turnover but saturation levels of demand quickly re-filled the available parking spaces.

- **Parking pricing programs may need to include non-pricing elements**. Improving parking availability requires a multi-prong approach that addresses the number of metered spaces, parking meter technology, time limits, hours of operation, and deliveries. Addressing these issues strengthens the effectiveness of the program. It also demonstrates that the City's goal is to address parking availability and not merely to raise parking revenue.

  The need for non-pricing elements was particularly evident in Park Slope, where stakeholders correctly pointed out that the neighborhood's acknowledged parking problems arise from a confluence of factors. NYCDOT installed parking meters on additional block faces along the corridors; instituted morning truck delivery windows; and replaced single-space meters with multi-space meters that accept credit and debit cards as well as coins. All of these actions came at the suggestion of stakeholder representatives.

- **Data collection and data processing are also important program elements**. The extensive data collection program was important to understanding program impacts and advancing the program with neighborhood stakeholders. As discussed in detail in Ng et. al., *(10)* implementation of the data collection program required development of standardized data collection forms, an SQL relational database and extensive quality assurance/quality control procedures to process, store and analyze the high volume of data generated by the data collection program.

- **85% occupancy may not be sufficient.** Parking pricing programs have often adopted a target occupancy of 85%, *(1)* meaning that there is on average one parking space available at any given time for every seven parking spaces. In practice, this means an average of one available space per block on relatively short blocks, with a larger number of available spaces on longer blocks.

  Intuitively, one available space per block would seem to provide a satisfactory level of parking availability. In practice, however, available spaces are often clustered in

relatively few blocks, leaving stretches of block faces without any available spaces and leading to illegal parking, even with 85% or lower occupancy rates.

This issue was documented by the survey of drivers in Park Slope. The survey was conducted during the noon to 4 p.m. peak period simultaneously with block-by-block data collection that showed average occupancy of 87%. In the survey of 309 drivers who had just parked, 40% said that finding a metered parking space was "very frustrating," 34% said it was "somewhat frustrating" and only 13% said it was "not frustrating." (12% had no opinion or did not answer.)

Thus, it appears that an occupancy rate lower than 85% is needed to provide a desirable level of parking availability for drivers searching for a parking space. Based on data in the pilots it appears that overall availability rates in the 70-80% range provide a much higher chance for drivers to find a parking space within a few blocks of their destination.

- **Intensive outreach and community engagement is critical to developing a successful program.** NYCDOT's community engagement process has been highly successful in helping key stakeholders understand program goals and how the pilots work. The process has also been instrumental for communicating program results to key stakeholders and communicating community concerns to NYCDOT. As a result of these processes, PARK Smart pilots were endorsed by each of the three affected Community Boards and merchant groups in each neighborhood. This support has been highly important in moving the program forward.

The focus on community engagement helped staff develop best practices that proved valuable in subsequent outreach efforts. Key lessons learned that are specific to the outreach component of the program are:

- **Start with outreach.** The very first step in each pilot was a discussion of the program with key community stakeholders. NYCDOT took the program concept and goals and an overall approach to implementation into these discussions, but developed specific program features such as geographic coverage, pricing levels, hours for the peak rate to be in effect, in collaboration with community stakeholders. This approach allowed stakeholders to help shape the program and enhanced local buy-in.

- **Start with individuals and small groups.** The initial set of meetings took place in individual and small group settings, which were conducive to an open conversation and clear communication between the stakeholders and agency staff.

- **Use stakeholder representatives as liaisons to their groups**. This may seem to be an obvious point, but it is important to note the dual role that becomes a balancing act for these representatives. Merchant group representatives in particular, were instrumental in educating their members about the program and building support for it. But they also represent their membership's views to NYCDOT, whether supportive or not. NYCDOT staff thus needed to be sensitive to the tension between these roles.

- **Build a shared understanding of parking conditions**. Community stakeholders have generally been quite interested in NYCDOT's data collection and monitoring, and sophisticated in their ability to understand the results. Responding effectively to this interest has needed to go beyond simply presenting results, however. It has been important to share data collection plans and make changes based on feedback. In some cases, key stakeholders accompanied NYCDOT and consultant staff during data collection so that all parties could verify that the results when compiled accurately reflect

observed conditions. Finally, it has proven important to present results in fashion that is readily understandable to audiences with varied levels of experience with data of this type.

- **Develop ongoing relationships**. NYCDOT maintained contact with stakeholders throughout the planning, implementation and evaluation phases, primarily through in-person meetings. Agency staff and community representatives developed a valuable level of mutual trust and understanding, even when there were disagreements. Consistent with the Woody Allen maxim that "80% of life is just showing up," the process of developing these relationships was critical.

- **Be responsive to concerns about rapid increases in parking rates.** A key program design decision obviously involves setting the peak rate. Key stakeholders, in particular merchant groups in Park Slope, are highly concerned with the potential impacts of higher meter rates. Merchant representatives are highly concerned that "sticker shock" will send potential customers to big box stores less than a mile away which offer free parking, or to restaurants and shops in other neighborhoods that continue to have lower parking rates. NYCDOT has been sensitive to these concerns in setting parking rates and in considering the pace of making further changes.

CONCLUSION

Parking pricing, like congestion pricing, offers the opportunity to improve the operation of city streets, make parking more readily available to drivers, and reduce traffic congestion. Unlike congestion pricing, it can be targeted to specific corridors within a street grid and to specific areas.

The New York City experience with parking pricing has shown that pricing can be effective in achieving the goals of increasing turnover and improving parking availability. At the same time, the city's experience highlights the multidimensional nature of traffic and mobility issues. Thus, in the extremely dense Midtown and Downtown Manhattan business districts, parking pricing can be effective in increasing availability of curb space for commercial loading and thus reduce double-parking and clear lanes for through traffic. Pricing does not, however, affect traffic volumes generated by the large number of circulating taxicabs or the significant volume of through traffic.

The PARK Smart pilots have shown that the impact of pricing differs depending on neighborhood characteristics, most notably existing levels of parking demand and the availability of off-street parking. These pilots also demonstrate the importance of stakeholder engagement in achieving public understanding and support and developing an effective program.

The New York experience also shows that parking pricing can be combined with other curb management tools such as bus lanes, delivery windows, off-hour deliveries and other measures to help reconcile competing needs for often oversubscribed curb space. Parking pricing thus joins the transportation agency's toolbox of effective measures to work toward the larger goals of a sustainable transportation network, improved quality of life and urban economic vitality.

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